Amendment of the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

LISTING OF CLAIMS

1: (Currently Amended) A method comprising:

receiving a packet;

applying an Active Rule to the received Packet;

accessing a cached Condition Set Table, having at least one Condition Set, associated with the Active Rule;

for each Condition Set, having at least one Condition, in the cached Condition Set Table,

evaluating the Condition(s) in the Condition Set, wherein the evaluating includes

utilizing the Condition Set Table to access a Condition Indirection Table, having a pointer to each Condition, wherein the pointers are grouped by Condition Set; and

utilizing the pointers to access a Condition Table having the Conditions, and

determining if the Condition Set is met;

determining if the Active Rule is met; and

executing an Action Set associated with the Active Rule.

2: (Currently Amended) The method of claim 1, wherein applying an Active Rule to the received Packet includes:

parsing a cached Rules Tables, having a plurality of rules, to determine if a rule is pertinent to the received packet;

if so, making the pertinent rule the Active Rule.

3: (Original) The method of claim 2, wherein applying an Active Rule to the received Packet includes:

if more than one rule in the Rules Table is pertinent, performing the method of claim 1 for each pertinent rule.

4: (Original) The method of claim 2, wherein the received packet includes a source, a destination, and a protocol;

wherein the rules in the Rules Table includes a source, a destination, and a protocol; and

wherein determining if a rule is pertinent to the received packet includes:
determining if the source of the received packet and the source of the rule are equivalent;
determining if the destination of the received packet and the destination of the rule are equivalent;
determining if the protocol of the received packet and the protocol of the rule are equivalent;
if all three are equivalent, considering the rule pertinent to the received packet.

5: (Currently Amended) The method of claim 2, wherein applying an Active Rule to the received Packet includes:

selecting a rule from a Rules Table, having at least one rule; and

accessing a Rule Group from a Rules Group Table;

wherein the Rule Group includes a field to facilitate access to ~~the~~ a first Condition Set associated with the rule, and a field to facilitate access to ~~the~~ a first Action Set associated with the rule.

6: (Original) The method of claim 5, wherein accessing a cached Condition Set Table includes:

accessing the Condition Set Tables utilizing the Rule Group's field to facilitate access to the first Condition Set associated with the rule.

7: (Original) The method of claim 1, wherein each of the at least one Conditions includes pattern, and an opcode; and

wherein evaluating the Condition(s) in the Condition Set includes:

for each Condition,

comparing the pattern to the received packet in the manner dictated by the opcode, and

producing a Boolean value as a result of the comparison; an

wherein determining if the Condition Set is met includes:

computing a single Boolean value utilizing the Boolean values resulting from evaluating the Condition(s).

8: (Original) The method of claim 7, wherein each of the at least one Conditions further includes at least one of the fields selected from a group including of the following:

a bit offset where the pattern is to be found,

a pattern mask to alter interpretation of the pattern,

a mask value to alter interpretation of received packet, and

a pattern length.

9: (Original) The method of claim 7, wherein each of the at least one Conditions further includes a flag to denote that the Condition has already been evaluated for the current received packet, and a value denoting the result of that evaluation.

10: (Original) The method of claim 7, wherein computing a single Boolean value utilizing the Boolean values resulting from evaluating the Condition(s) includes:

utilizing a 1-bit Condition Accumulator to logically AND, as each Condition's Boolean value is computed, the Boolean values resulting from evaluating the Condition(s).

11: (Original) The method of claim 7, wherein determining if the Active Rule is met includes:

computing a single Boolean value utilizing the Boolean values resulting from determining if the Condition Set is met.

12: (Original) The method of claim 11, wherein computing a single Boolean value utilizing the Boolean values resulting from determining if the Condition Set is met includes:

utilizing a 1-bit Condition Set Accumulator to logically OR, as each Condition Set's Boolean value is computed, the Boolean values resulting from determining if the Condition Set is met.

13: (Canceled)

14: (Currently Amended) The method of claim 13, wherein any Condition ~~may be~~is included by a plurality of Condition Sets.

15: (Currently Amended)The method of claim 13, wherein the Condition Indirection Table is stored within a Content Addressable Memory (CAM).

16: (Currently Amended) The method of claim 1, wherein executing ~~an~~ the Action Set associated with the Active Rule includes:

accessing ~~an~~ the Action Set having at least one Action; and

executing each Action within the Action Set.

17: (Original) The method of claim 16, wherein executing each Action includes performing one of the Actions selected from a group including the following:

altering the packet header,

altering the packet contents,

reporting information to a third party, and

changing the priority status of the packet.

18: (Original) The method of claim 16, wherein accessing an Action Set having at least one Action includes:

accessing a Rule Group having a pointer to the Action Set;

accessing an Action Set Table having a plurality of Action Sets; and

selecting an Action Set from the Action Set Table.

19: (Original) The method of claim 1, wherein the number of Conditions in a Condition Set is limited, at least in part, by the amount of information that can be read from a cache memory in one clock cycle.

20: (Original) The method of claim 1, wherein the number of Actions in an Action Set is limited, at least in part, by the amount of information that can be read from a cache memory in one clock cycle.

21: (Currently Amended) An apparatus comprising:

a micro-engine having a rule based action packet processing engine that is capable of

processing a received packet,

accessing the Condition Set Tables utilizing the Rule Group's field to facilitate access to the first Condition Set associated with the rule,

utilizing the Condition Set Table to access a Condition Indirection Table, having a pointer to each Condition, wherein the pointers are grouped by Condition Set, and

utilizing the pointers to access a Condition Table having the Conditions, and

wherein the Condition Set Table is stored as a data structure within the cache memory,

a network processor core that is capable of resource management and control of the micro-engine;

a packet buffer to receive a packet; and

a cache memory to store data structures for the micro-engine.

22: (Original) The apparatus of claim 21, further including a plurality of micro-engines to process a plurality of received packets substantial simultaneously.

23: (Original) The apparatus of claim 21, wherein the micro-engine includes:

an ingress packet processing engine to receive a packet;

an egress packet processing engine to forward a processed packet; and

a Rule Based Action Packet Processing Engine that is capable of:

applying an Active Rule to the received Packet;

accessing a cached Condition Set Table, having at least one Condition Set, associated with the Active Rule;

for each Condition Set, having at least one Condition, in the Condition Set Table,

evaluating the Condition(s) in the Condition Set, and

determining if the Condition Set is met;

determining if the Active Rule is met; and

executing an Action Set associated with the Active Rule.

24: (Original) The apparatus of claim 23, wherein the Rule Based Action Packet Processing Engine's capability to apply an Active Rule to the received Packet includes the capability to:

parse a cached Rules Tables, having a plurality of rules, to determine if a rule is pertinent to the received packet;

if so, make the pertinent rule the Active Rule.

25: (Original) The apparatus of claim 24, wherein the received packet includes a source, a destination, and a protocol;

wherein the rules in the Rules Table includes a source, a destination, and a protocol; and

wherein the Rule Based Action Packet Processing Engine's is capable of:
determining if the source of the received packet and the source of the rule are equivalent;
determining if the destination of the received packet and the destination of the rule are equivalent;
determining if the protocol of the received packet and the protocol of the rule are equivalent;
if all three are equivalent, considering the rule pertinent to the received packet.

26: (Original) The apparatus of claim 24, wherein the Rule Based Action Packet Processing Engine's is capable of, when applying an Active Rule to the received Packet:

selecting a rule from a Rules Table, having at least one rule; and

accessing a Rule Group from a Rules Group Table;

wherein the Rule Group includes a field to facilitate access to the first Condition Set associated with the rule, and a field to facilitate access to the first Action Set associated with the rule.

27: (Original) The apparatus of claim 23, wherein each of the at least one Conditions includes pattern, and an opcode; and
wherein the Rule Based Action Packet Processing Engine's is capable of, when evaluating the Condition(s) in the Condition Set:

for each Condition,

comparing the pattern to the received packet in the manner dictated by the opcode, and

producing a Boolean value as a result of the comparison; an
wherein determining if the Condition Set is met includes:

computing a single Boolean value utilizing the Boolean values resulting from evaluating the Condition(s).

28: (Original) The apparatus of claim 27, wherein the Rule Based Action Packet Processing Engine includes a 1-bit Condition Accumulator; and
the Rule Based Action Packet Processing Engine is capable of, when computing a single Boolean value utilizing the Boolean values resulting from evaluating the Condition(s):

utilizing the 1-bit Condition Accumulator to logically AND, as each Condition's Boolean value is computed, the Boolean values resulting from evaluating the Condition(s).

29: (Original) The apparatus of claim 27, wherein the Rule Based Action Packet Processing Engine is capable of, when determining if the Active Rule is met:

computing a single Boolean value utilizing the Boolean values resulting from determining if the Condition Set is met.

30: (Original) The apparatus of claim 29, wherein the Rule Based Action Packet Processing Engine includes a 1-bit Condition Set Accumulator; and
the Rule Based Action Packet Processing Engine is capable of, when computing a single Boolean value utilizing the Boolean values resulting from determining if the Condition Set is met:

utilizing the 1-bit Condition Set Accumulator to logically OR, as each Condition Set's Boolean value is computed, the Boolean values resulting from determining if the Condition Set is met.

31: (Canceled)

32: (Currently Amended) The apparatus of claim ~~31~~21, wherein Micro-Engine includes a Content Addressable Memory (CAM); and
the Condition Indirection Table is stored within the Content Addressable Memory.

33: (Original) The apparatus of claim 23, wherein the Rule Based Action Packet Processing Engine is capable of, when executing an Action Set associated with

the Active Rule:

accessing an Action Set having at least one Action; and

executing each Action within the Action Set; and

the Action Set is stored a data structure within the cache memory.

34: (Original) The apparatus of claim 33, wherein the Rule Based Action Packet Processing Engine is capable of performing one of the Actions selected from a group including the following:

altering the packet header,

altering the packet contents,

reporting information to a third party, and

changing the priority status of the packet.

35: (Original) The apparatus of claim 33, wherein the Rule Based Action Packet Processing Engine is capable of, when accessing an Action Set:

accessing a Rule Group having a pointer to the Action Set;

accessing an Action Set Table having a plurality of Action Sets; and

selecting an Action Set from the Action Set Table.

36: (Original) The apparatus of claim 23, wherein the number of Conditions in a Condition Set is limited, at least in part, by the amount of information that can be read from a cache memory in one clock cycle.

37: (Original) The apparatus of claim 23, wherein the number of Actions in an Action Set is limited, at least in part, by the amount of information that can be read from the cache memory in one clock cycle.

38: (Original) The apparatus of claim 35, wherein the cache memory includes a SRAM.

39: (Original) The apparatus of claim 38, wherein the packet buffer includes a DRAM.

40: (Original) The apparatus of claim 39, wherein the network processor core is further capable of receiving instructions via a generic programmable interface; and

the received instructions are capable of altering the Condition Set and the Action Set.

41: (Currently Amended) An article comprising:

a storage medium; and

~~having a~~ plurality of machine accessible programming instructions stored on the storage medium and configured to program a computing device to, ~~wherein when the instructions are executed, the instructions provide for:~~

receiv~~e~~ing a packet;

apply~~ing~~ an Active Rule to the received Packet;

access~~ing~~ a cached Condition Set Table, having at least one Condition Set, associated with the Active Rule;

for each Condition Set, having at least one Condition, in the Condition Set Table,

evaluat~~e~~ing the Condition(s) in the Condition Set, wherein the evaluating includes

utilizing the Condition Set Table to access a Condition Indirection Table, having a pointer to each Condition, wherein the pointers are grouped by Condition Set; and

utilizing the pointers to access a Condition Table having the Conditions, and

determineing if the Condition Set is met;

determineing if the Active Rule is met; and

executeing an Action Set associated with the Active Rule.

42: (Original) The article of claim 41, wherein the instructions providing for applying an Active Rule to the received Packet includes instructions providing for:

parsing a cached Rules Tables, having a plurality of rules, to determine if a rule is pertinent to the received packet;

if so, making the pertinent rule the Active Rule.

43: (Original) The article of claim 42, wherein the instructions providing for applying an Active Rule to the received Packet includes instructions providing for:

if more than one rule in the Rules Table is pertinent, performing the method of claim 1 for each pertinent rule.

44: (Original) The article of claim 42, wherein the received packet includes a source, a destination, and a protocol;

wherein the rules in the Rules Table includes a source, a destination, and a protocol; and

wherein the instructions providing for determining if a rule is pertinent to the received packet includes instructions providing for:

determining if the source of the received packet and the source of the rule are equivalent;

determining if the destination of the received packet and the destination of the rule are equivalent;

determining if the protocol of the received packet and the protocol of the rule are equivalent;

if all three are equivalent, considering the rule pertinent to the received packet.

45: (Currently Amended) The article of claim 42, wherein the instructions providing for applying an Active Rule to the received Packet includes instructions providing for:

selecting a rule from a Rules Table, having at least one rule; and

accessing a Rule Group from a Rules Group Table;

wherein the Rule Group includes a field to facilitate access to ~~the~~ a first Condition Set associated with the rule, and a field to facilitate access to ~~the~~ a first Action Set associated with the rule.

46: (Original) The article of claim 45, wherein the instructions providing for accessing a cached Condition Set Table includes instructions providing for:

accessing the Condition Set Tables utilizing the Rule Group's field to facilitate access to the first Condition Set associated with the rule.

47: (Original) The article of claim 41, wherein each of the at least one Conditions includes pattern, and an opcode; and

wherein the instructions providing for evaluating the Condition(s) in the Condition Set includes instructions providing for:

for each Condition,

comparing the pattern to the received packet in the manner dictated by the opcode, and

producing a Boolean value as a result of the comparison; an

wherein determining if the Condition Set is met includes:

computing a single Boolean value utilizing the Boolean values resulting from evaluating the Condition(s).

48: (Original) The article of claim 47, wherein each of the at least one Conditions further includes at least one of the fields selected from a group including of the following:

a bit offset where the pattern is to be found,

a pattern mask to alter interpretation of the pattern,

a mask value to alter interpretation of received packet, and

a pattern length.

49: (Original) The article of claim 47, wherein each of the at least one Conditions further includes a flag to denote that the Condition has already been evaluated for the current received packet, and a value denoting the result of that evaluation.

50: (Original) The article of claim 47, wherein the instructions providing for computing a single Boolean value utilizing the Boolean values resulting from evaluating the Condition(s) includes instructions providing for:

utilizing a 1-bit Condition Accumulator to logically AND, as each Condition's Boolean value is computed, the Boolean values resulting from evaluating the Condition(s).

51: (Original) The article of claim 47, wherein the instructions providing for determining if the Active Rule is met includes instructions providing for:

computing a single Boolean value utilizing the Boolean values resulting from determining if the Condition Set is met.

52: (Original) The article of claim 51, wherein the instructions providing for computing a single Boolean value utilizing the Boolean values resulting from determining if the Condition Set is met includes instructions providing for:

utilizing a 1-bit Condition Set Accumulator to logically OR, as each Condition Set's Boolean value is computed, the Boolean values resulting from determining if the Condition Set is met.

53: (Canceled)

54: (Currently Amended)The article of claim ~~53~~41, wherein any Condition ~~may be~~is included by a plurality of Condition Sets.

55: (Currently Amended) The article of claim ~~53~~41, wherein the Condition Indirection Table is stored within a Content Addressable Memory (CAM).

56: (Currently Amended) The article of claim 41, wherein the instructions providing for executing ~~an~~ the Action Set associated with the Active Rule includes instructions providing for:

accessing ~~an~~ the Action Set having at least one Action; and

executing each Action within the Action Set.

57: (Original) The article of claim 56, wherein the instructions providing for executing each Action includes instructions providing for performing one of the Actions selected from a group including the following:

altering the packet header,

altering the packet contents,

reporting information to a third party, and

changing the priority status of the packet.

58: (Original)The article of claim 56, wherein the instructions providing for accessing an Action Set having at least one Action includes instructions providing for:

accessing a Rule Group having a pointer to the Action Set;

accessing an Action Set Table having a plurality of Action Sets; and

selecting an Action Set from the Action Set Table.

59: (Original) The article of claim 41, wherein the number of Conditions in a Condition Set is limited, at least in part, by the amount of information that can be read from a cache memory in one clock cycle.

60: (Original)The article of claim 41, wherein the number of Actions in an Action Set is limited, at least in part, by the amount of information that can be read from a cache memory in one clock cycle.